

# SPC Forcefield Air Curtains

Installation, Operation and Maintenance Instructions

IOM 83 Issue 4



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# 1. General

## 1.1 Description

This manual covers the SPC Forcefield range of exposed, recessed and concealed air curtain units. The units are available in a number of lengths suitable for horizontal ceiling mounting or vertical wall mounting and are available with low pressure hot water or electric heat exchangers. Other accessories may be supplied depending on the details of the particular order. Power supply to the units is 230V, single phase, 50Hz for the low pressure hot water models and 400V, three phase, 50Hz for the electric heated models. The units include a number of EC/DC individual forward curved blowers which are speed

controllable.

The heaters are intended for use in internal environments and must not be used outdoors or where they are subjected to moisture. They must be installed by experienced heating contractors and electricians in compliance with all statutory regulations. Table 1 gives general details for the standard range of units. Table 2 lists the nominal size and weights for the range. The selection of images below give an overview of the pertinent components and dimensions and various styles and sizes of unit along with positions of fixing holes etc.

Heater type	High powered air curtain
Heating element	Low pressure hot water or electric resistance
Fan type	Individual forward curved double inlet blowers
Motor type	ECDC
Power supply	230V/1Ph/50Hz for LPHW models, 400V/3Ph/50Hz for electric heated models
Casing	Powder coated steel
Max. mounting height	Up to 4m, 3.5m recommended
Min. mounting height	2.5m
Max. hot water temperature	90°C
Max. working pressure	15 bar
Max. entering air temperature	30°C
Max. storage temperature	50°C non-condensing

Table 1. General specification

Unit size (width)	1000	1500	2000	2500
Nominal WxHxD (mm) exposed units	1000x270x530	1500x270x530	2000x270x530	2500x270x530
Nominal WxHxD (mm) concealed/recessed units	1000x270x800	1500x270x800	2000x270x800	2500x270x800
Approx weight LPHW (kg)	40	55	80	105
Approx. weight electric (kg)	38	50	73	97

Table 2. Nominal dimensions/weights

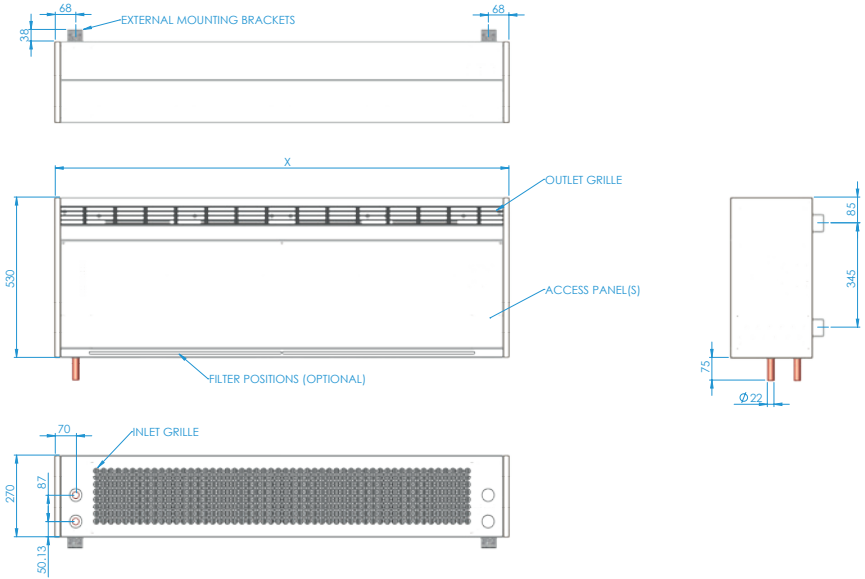


Figure 1. Horizontal exposed LPHW model with fixing brackets

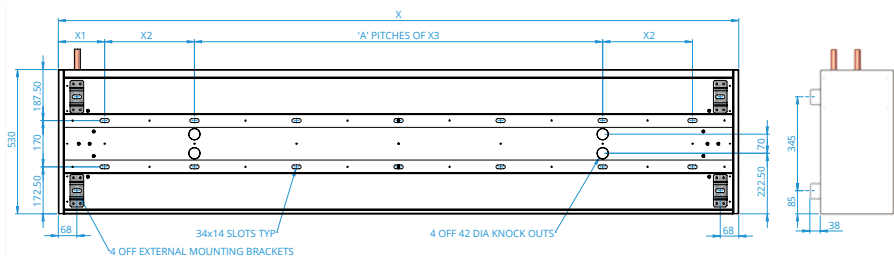


Figure 2. Top/back plate showing position of fixing slots and brackets

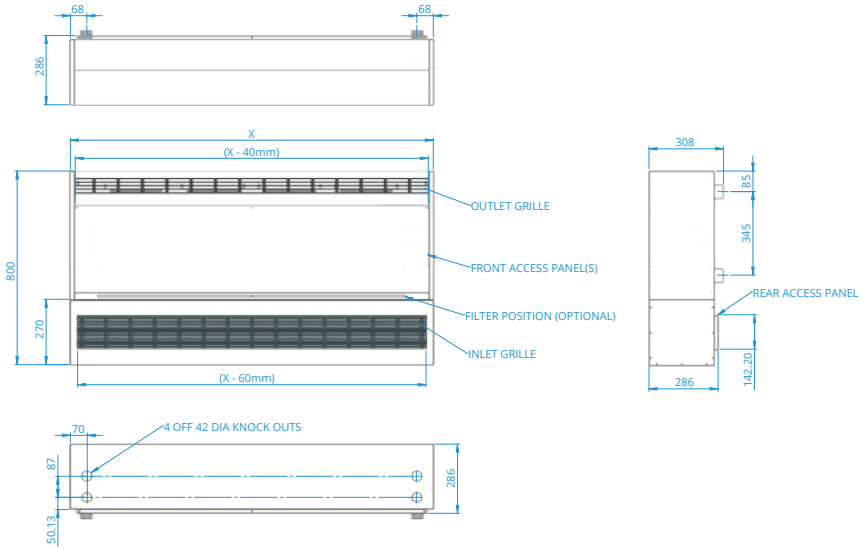


Figure 3. Recessed LPHW model with fixing brackets

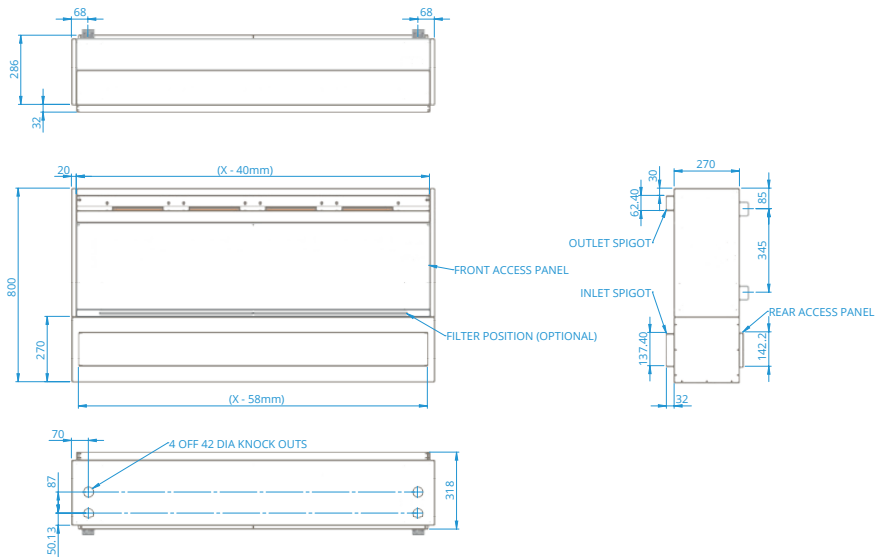


Figure 4. Concealed LPHW unit with spigots on inlet and outlet and fixing brackets

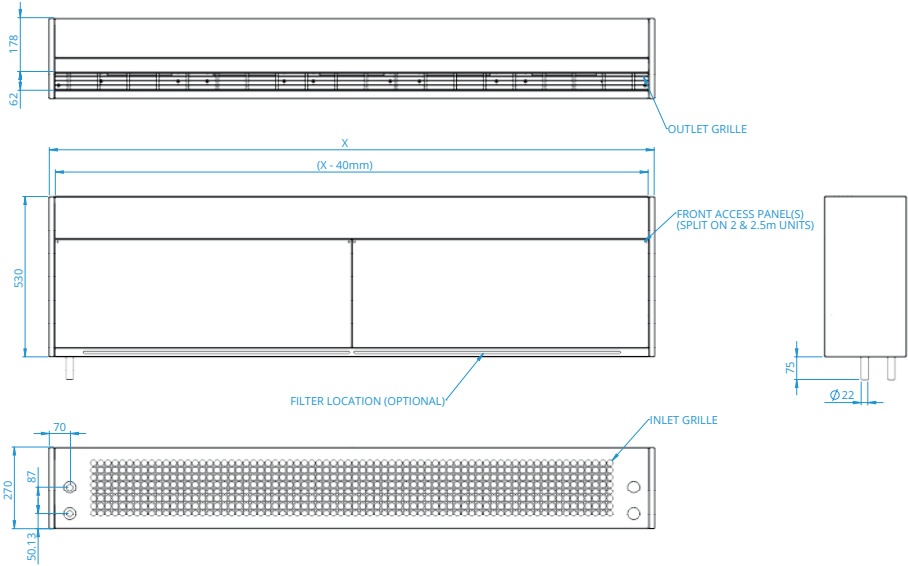


Figure 5. Vertical exposed LPHW unit

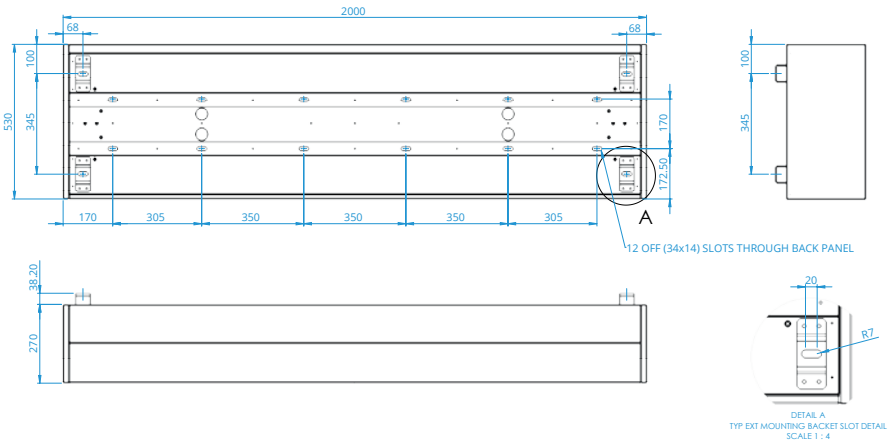


Figure 6. Details of optional fixing brackets for horizontal units

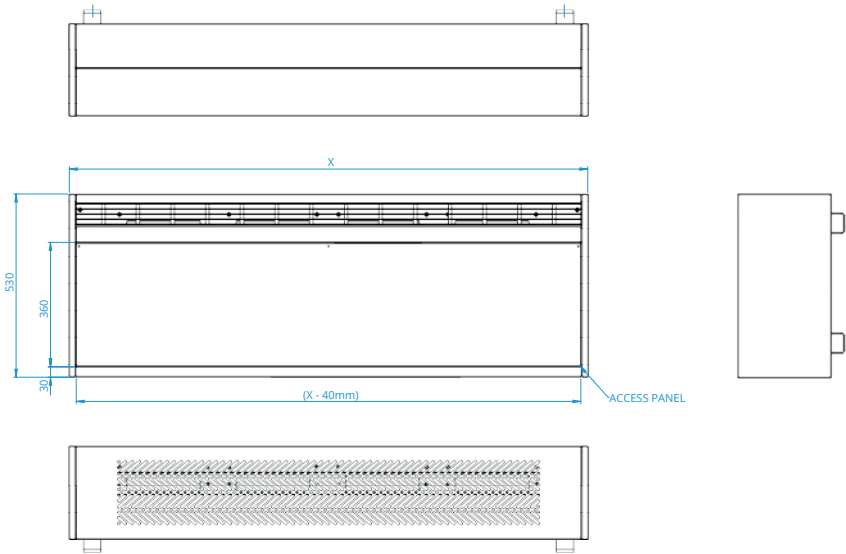


Figure 7. Horizontal exposed electric unit with fixing brackets

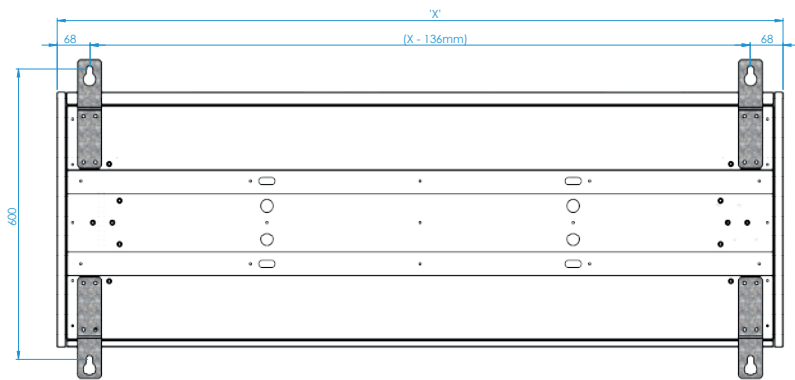


Figure 8. Vertical exposed unit with optional fixing brackets

X	X1	X2	X3	A
1000	175	650	-	-
1500	434	632	-	-
2000	170	305	350	3
2500	170	330	375	4

Table 3. Dimensions for use with images, all in mm

## 1.2 Receipt and Preparation

The units are wrapped and display the serial number, model reference and site reference where appropriate. Installation, operation and maintenance instructions and wiring diagrams, together with any special instructions are all supplied with the unit. On receipt check that all details are correct to the customer schedule prior to opening packaging.

Damage should be reported to SPC immediately. It is recommended that packaging is kept in place and the units stored in a safe area until the necessary services are completed in order to avoid the possibility of site damage.

All units are guaranteed for 12 months from date of delivery.

# 2. Installation

## 2.1 Mounting general

There are two versions of the unit available; horizontal for mounting to the ceiling via hanging rods and vertical for mounting directly to a wall. All concealed and recessed models are horizontal for ceiling mounting. Recessed models are intended for installation in a false ceiling grid with inlet and outlet grilles on view, concealed models are hung above the ceiling (typically plasterboard) and have spigots on the inlet and outlet for ducting to grilles by others fitted in the ceiling. The horizontal version must be arranged to hang

from threaded rods anchored to the ceiling while the vertical model needs bolts to be fitted into suitable load bearing anchors in the wall. Optional fixing brackets are available.

For maximum effectiveness the units should be mounted such that the outlet grille is no more than 4m from the floor level and the width of the doorway should be less than or equal to the width of the air curtain.

### 2.1.1 Horizontal, exposed units

Horizontal, exposed units are fitted with the inlet grille on the room side such that air is drawn into the unit horizontally and then blown down vertically across the door. The units must be fitted internally with the outlet grille as close as possible to the top of the door being protected.

The figures above show the positions of the fixing holes in the strengthening bars fitted to the top of the unit. Units should be hung from the ceiling via threaded rod, M8 minimum. The ceiling should be marked out according to the position of the holes shown on the drawing and then drilled to suit the anchors that are to be used. Take note of the unit weight when sizing anchors.

After hanging the rods the unit should be supported and offered up with the access panel removed and the rods fixed and adjusted inside with washers and nuts making all necessary fine adjustments to ensure that the unit is level.

Optional fixing brackets are available. These are fitted to the four corners of the unit and allow the fixing rods to be secured to the top of the unit externally rather than via the access panel.

### 2.1.2 Horizontal concealed/recessed units

These units are fitted either totally above a ceiling (concealed unit) or flush with the false ceiling grid (recessed unit). They are hung as per the exposed horizontal units and fixing holes/brackets are in the same position.

Concealed units have simple spigots for inlets and outlets. These need to be arranged to be directly

above grilles (by others) fitted in the ceiling. Alternatively, ducting will be required between the spigots and the ceiling grilles. Any ducting should be limited in length and not provide an airside resistance in excess of 50Pa. Electric units should not be ducted.

### 2.1.3 Vertical units

Vertical units are fitted internally with the inlet grille on the top of the unit such that the space air is drawn in and blown out of the unit vertically. To facilitate this a minimum of 150mm must be available between the top of the unit and the ceiling. The outlet grille at the bottom of the unit must be arranged to be as close as possible to the top of the door being protected.

The figures above show the positions of the fixing holes in the strengthening bars fitted to the back of the unit. The wall should be marked accordingly

and drilled to suit the type of anchor being used. Use a spirit level to ensure that the unit will mount level. Take note of the unit weights when sizing anchors.

Having fitted the anchors the unit should be offered up to the wall while being supported and fixed using suitable lag bolts and washers while the unit's access panel is removed.

Optional fixing brackets are available to allow the units to be fixed to the wall from outside the unit.

## 2.2 Fluid piping

Maximum supply hot water temperatures should not exceed 90°C. The temperatures and flowrates given on the quotation and/or order paperwork should be respected.

It is recommended that isolating valves are fitted on both the flow and return as close as possible to the unit.

Hot water units are provided with 22mm copper flow and return connections which terminate above the top of vertical units and beyond the rear (inlet) of horizontal units.

The connections terminate outside the units and it is recommended that 22mm copper pipe is used to connect up to the units with final connections being made via compression fittings, solder joints or push-fit fixings. If soldered joints

are used then wet rags should be wrapped around the pipework to prevent damage. Pipe ends should always be thoroughly deburred for all types of joint.

If valves are used for control these are fitted external to the unit and would normally be 2 way fitted in the return pipework. 3 way valves can be used if required with a bypass leg built in.

It is recommended that air vents are fitted in the pipework at its high point to purge air from the heat exchangers. Automatic vents should be used unless the pipework is to be regularly purged manually.

## 2.3 Wiring

### 2.3.1 Hot water units

Hot water units all run off a single phase 230V supply and power to the unit is via a 3 core L,N,E cable which should be from a suitable local isolator which is adjacent and accessible to the unit. Maximum power draw is shown in table 2 for hot water units. Power can be brought into the unit via knock-outs or holes

drilled in the casing but should always be suitably grommeted.

#### **Units must be earthed.**

A variety of control options are available and a specific wiring diagram will be supplied with each unit.

Unit size (width)	1000	1500	2000	2500
No. fans	2	3	4	5
Supply (V/Ph/Hz)	230/1/50	230/1/50	230/1/50	230/1/50
Maximum power draw (W)	180	360	450	540

Table 4. Electrical details for hot water units

### 2.3.2 Electric heated units

Electric heated units are all powered from a 3 phase supply and should be fed via a suitably sized 3 phase local isolator which should be accessible and adjacent to the unit. Where power cables are brought into the unit through knock-outs or drilled holes these must be suitably grommeted. Table 3 gives details of the electrical characteristics.

#### **Units must be earthed.**

A variety of control options are available and a specific wiring diagram will be supplied with each unit.

Unit size (width)	1000	1500	2000	2500
No. fans	2	3	4	5
Supply (V/Ph/Hz)	400/3/50	400/3/50	400/3/50	400/3/50
FLC (A) per phase	14	21	27	36
Maximum power draw (W)	9200	13900	18500	24600

Table 5. Electrical details for electric heated units

## 2.4 Control/operation

### 2.4.1 Hot water units

SPC Forcefield units incorporate an array of EC/DC fan assemblies which draw in room air through the heat exchanger prior to the warmed air being released downwards parallel to the door.

For air curtains to operate correctly it is important that they maintain a minimum rate of airflow so as to generate a continuous curtain down to floor level. This requires that a minimum leaving air velocity is maintained at the outlet grille. While the EC/DC fans react to a 0 to 10V control signal to rotate at a continually variable speed it is more effective to maintain a constant fan speed and vary output using a 2 or 3 port water valve.

Output can be adjusted by varying the speed of the fan in a very effective manner but this can lead to the curtain effect being compromised.

### 2.4.2 Electric heated units

The units require uninterrupted airflow to function. **Under no circumstances must the inlet or outlet grilles or spigots be covered or airflow otherwise obstructed.** This will lead to the heating elements increasing in temperature and tripping out.

Electric heated units cannot be controlled via fan speed as there is a minimum cooling air requirement for the resistance heaters. It is

possible to vary the heat output between level one and two as the element is split into two stages with stage two being approximately 1.5 times stage one.

If fan speed control is utilised then there is a wide range of control options available from remote wall mounted switches and thermostats to wall mounted digital/programmable proportional controllers.

SPC can supply 2 port waterside control valves which open and close in response to the thermostats. If units are controlled by a BMS system then they can be arranged to accept either a 0 to 10V control signal or enable/disable signal. Control requirements must be specified at time of order.

Other than heat output control mentioned above control is best limited to on/off via either switch or thermostat. All control requirements must be specified at time of order.

## 3. Commissioning

Commissioning of SPC Forcefield heaters requires the following:

- Check rotation of all fans
- Check leaving air temperature along length of grille
- Check operation of any controls
- Check no excessive and/or unexpected noise

## 4. Maintenance

Cleaning – To ensure effective and safe operation of the unit it is imperative that the internal surfaces remain clean. In order to maintain the air curtain at maximum efficiency it is recommended, especially when mounted in dusty areas, that the unit is cleaned internally using a vacuum cleaner nozzle attachment and that this should be done at least once every 3 months depending on the environment. Alternatively, a dry cloth can be used but the unit must not be cleaned using water or spray. Under no circumstances should moisture be allowed in contact with the internal surfaces of the air curtain. Access to the inside of the unit can be achieved by removal of the access panel. **Always ensure that the unit is electrically isolated prior to removal of the panel for cleaning etc.** The external panels can be cleaned using a dry cloth or mild detergent but moisture must not be allowed to seep inside the casing.

If a filter is included on a hot water unit then this can be removed from the unit prior to cleaning, dried and refitted. After removal of the filter the coil heat exchanger can be cleaned with a vacuum cleaner or compressed air. It is recommended that the filter (if fitted) is inspected on a regular basis initially to determine the regularity with which it should be cleaned; this will depend on the environment and the level of dust etc.

Fan bearings – The forward curved fan(s) incorporate sealed for life bearing and no lubrication is required.

## 5. Fault finding

Below is a list of common faults and the steps required to resolve them.

Fault	Cause	Remedy
Fan(s) not running	No power	Check electricity supply to unit
	Fuse blown	Check unit fuse and any circuit breakers
	Controls	Check controls are not preventing fan(s) from operating
	Damaged fan/motor	Replace faulty fan assembly
Low leaving air temperature	Controls	Check controls are not preventing fan(s) and electric elements from energising on electric heated units. Check controls are not preventing valves from opening on hot water units
	No/low water flow and/or temperature	On hot water heated units check that there is a good flow of hot water reaching the unit and that there is not an excessive temperature drop between the flow and return pipes. High temperature drops indicate very low water flowrates. Check temperature of hot water flow to the unit.
	Over heat tripped	On electric heated units check there is no obstruction to airflow. Check fans are not prevented from rotating

Table 6. Fault finding

## 6. Disposal

Electrically heated trench units are constructed from chromium resistance wire elements, mild steel casings, aluminium grilles and mixed steel/aluminium fans. The heat exchanger, casing and grille assembly can all be disassembled and disposed of appropriately. Hot water heated units share common parts with electric units but have a

heat exchanger from copper tubes and aluminium fins. The units include fan assemblies from mixed materials and printed circuit boards which should be disposed of separately and in line with WEEE directives. It is not recommended that the units are disposed of with domestic waste but that the components are recycled as far as possible.







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